

CHAPTER 4

Watershed Mapping

What is a Watershed?

Before highways, post office boxes, and counties, people didn't have mailing addresses, they had "watershed addresses." A watershed, literally defined, is the region or area of land that drains into a body of water such as a lake, river, or stream. To truly know your waterway, and to discover how to plan your monitoring, you need to learn your own watershed address.

Water quality is a direct reflection of the surrounding watershed – our actions on the land are directly reflected in our streams, rivers, and lakes. If we manage our watersheds wisely, we can protect, preserve, and enjoy our aquatic resources forever.

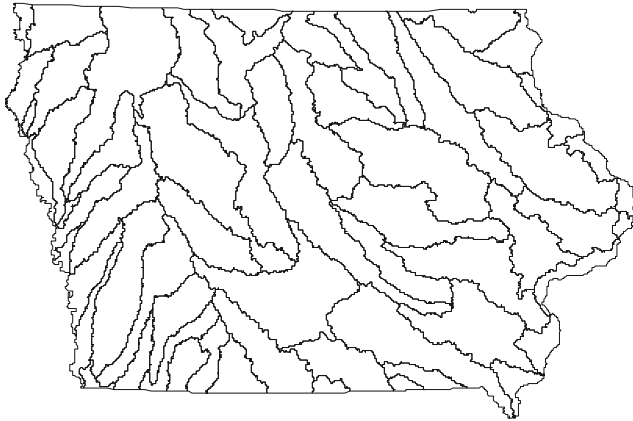
Hydrologic Unit Codes (HUCs)

Scientists use watershed identification numbers, called **Hydrologic Unit Codes (HUCs)**, to describe the different scales of watersheds and identify specific watersheds. This measurement of scale can be useful in identifying what watershed you want to consider as you plan your monitoring.

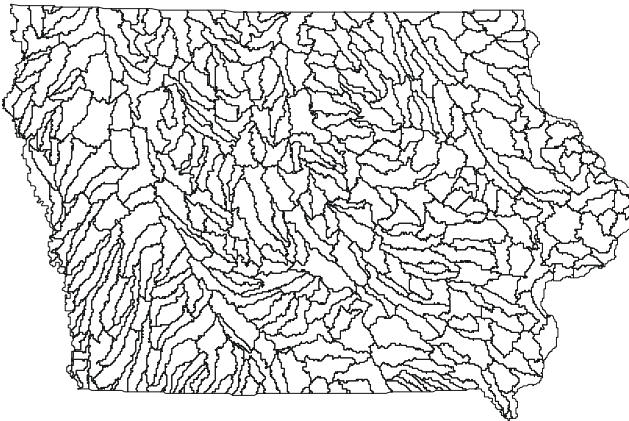
Within the HUC system, the United States is divided and sub-divided into successively smaller watersheds or **basins**. As the watersheds get smaller, the descriptive and unique HUC number gets larger. Iowa can be divided into 8-digit HUC, 10-digit HUC, and 12-digit HUC basins (see figure on the next page).

The focus of most of IOWATER stream monitoring sites is typically at the 12-digit HUC, termed the subwatershed level and also known as HUC 12, or below. The HUC 12 classification is currently the smallest watershed division used within the state and consists of watersheds that range from 15 to 62 square miles in size.

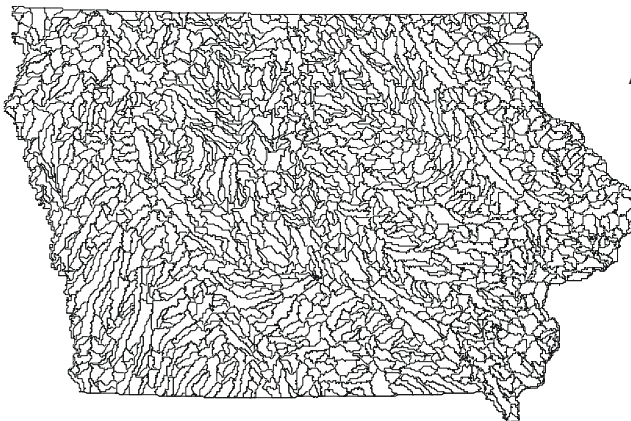
Hydrologic Unit Codes (HUCs)



8-digit HUCs
56 basins
390.6 - 1,953 mi²



10-digit HUCs
Approximately 400 basins
62.5 - 390.6 mi²



12-digit HUCs
Approximately 1,600 basins
15.6 - 62.5 mi²

This figure illustrates 8-digit, 10-digit, and 12-digit Hydrologic Unit Codes (HUCs) for Iowa.

Universal Transverse Mercator (UTM) Projection

An important part of starting your monitoring program is to find out "where on Earth are you?" To register a monitoring location, IOWATER needs your "watershed address," which in this case is a description of the exact point along the stream where you are monitoring.

There are several ways to describe a point on the Earth. They include a physical description, a legal description (the township-range system), latitude/longitude, and the **Universal Transverse Mercator** (UTM) projection. IOWATER uses the UTM system.

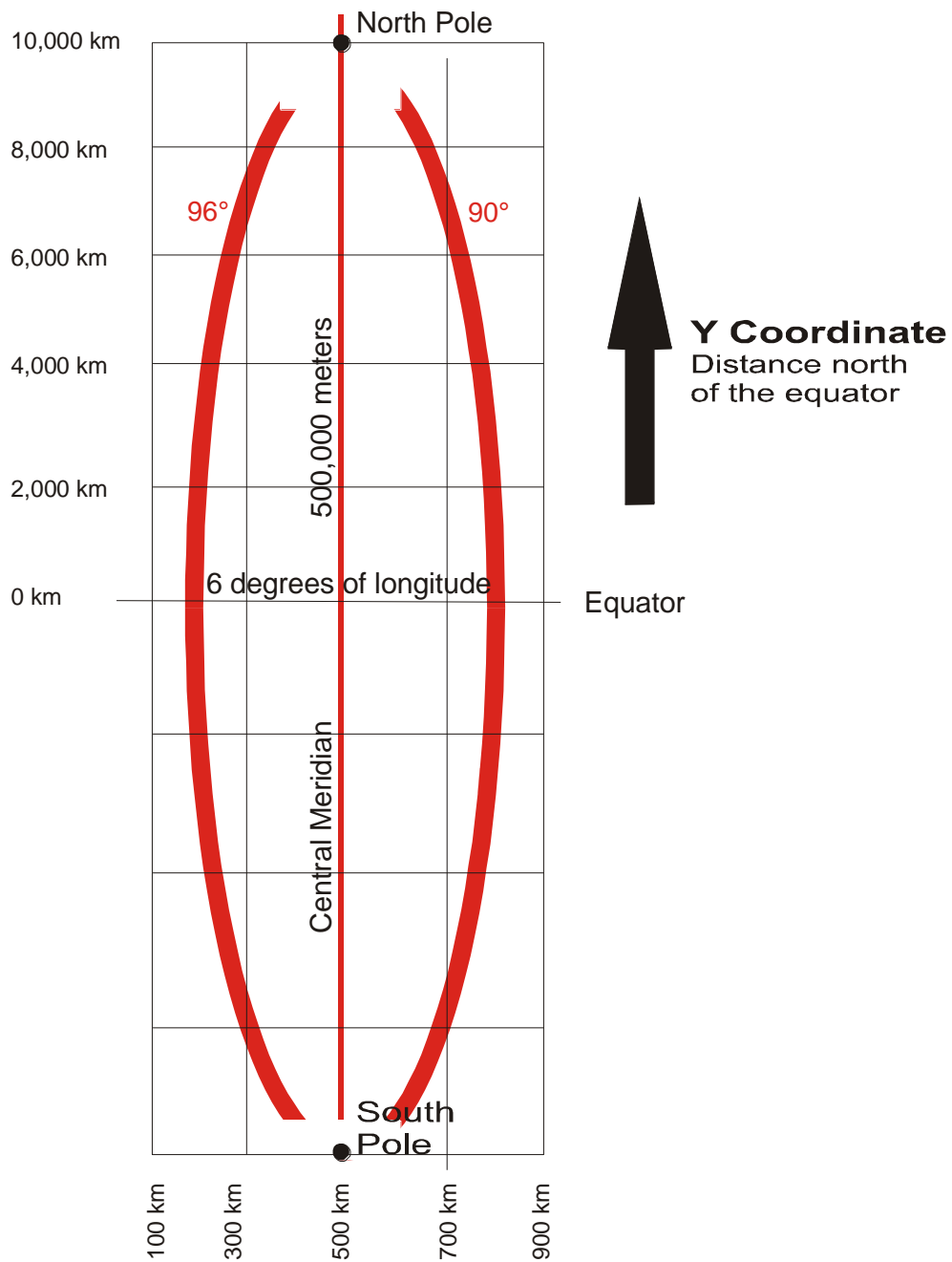
In the UTM system, the world is divided into 60 north-south zones, each covering a width six degrees of longitude, and each numbered 1 to 60 starting at 180°W longitude. The United States is covered by 10 zones (10-19), and most of Iowa is located in Zone 15. Parts of extreme western Iowa (Lyon, Sioux, Plymouth, Woodbury, Monona, Harrison, and Pottawattamie counties) are located in Zone 14.

UTM coordinates are given as two numbers, called the X and Y coordinates. The X coordinate is a six-digit number that yields an east-west reading, and the Y coordinate is a seven-digit number that yields a north-south reading. The X coordinate represents the number of meters east of the western edge of the zone, and the Y coordinate represents the number of meters north of the equator. You will use X and Y coordinates to register IOWATER monitoring sites, and information on how to obtain these coordinates will be covered in the next section.



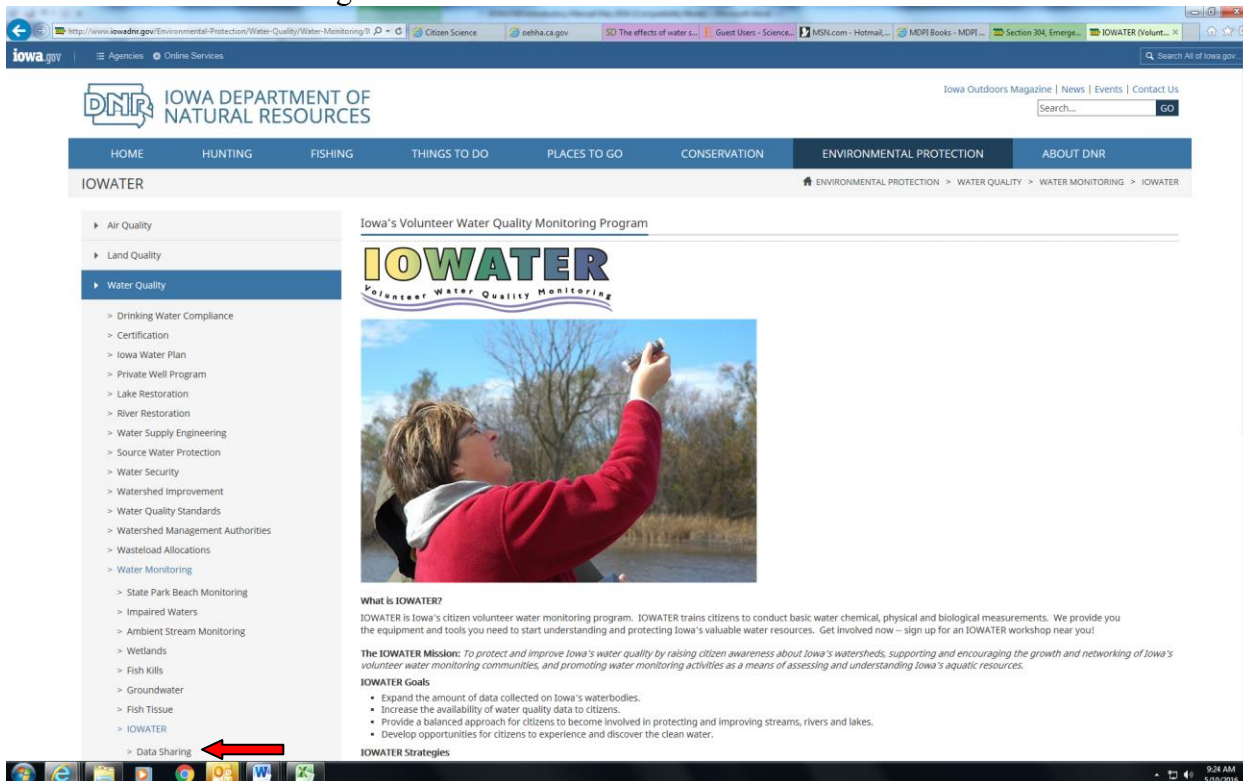
Figure from USGS <http://erg.usgs.gov/isb/pubs/factsheets/fs07701.html>

Zone 15

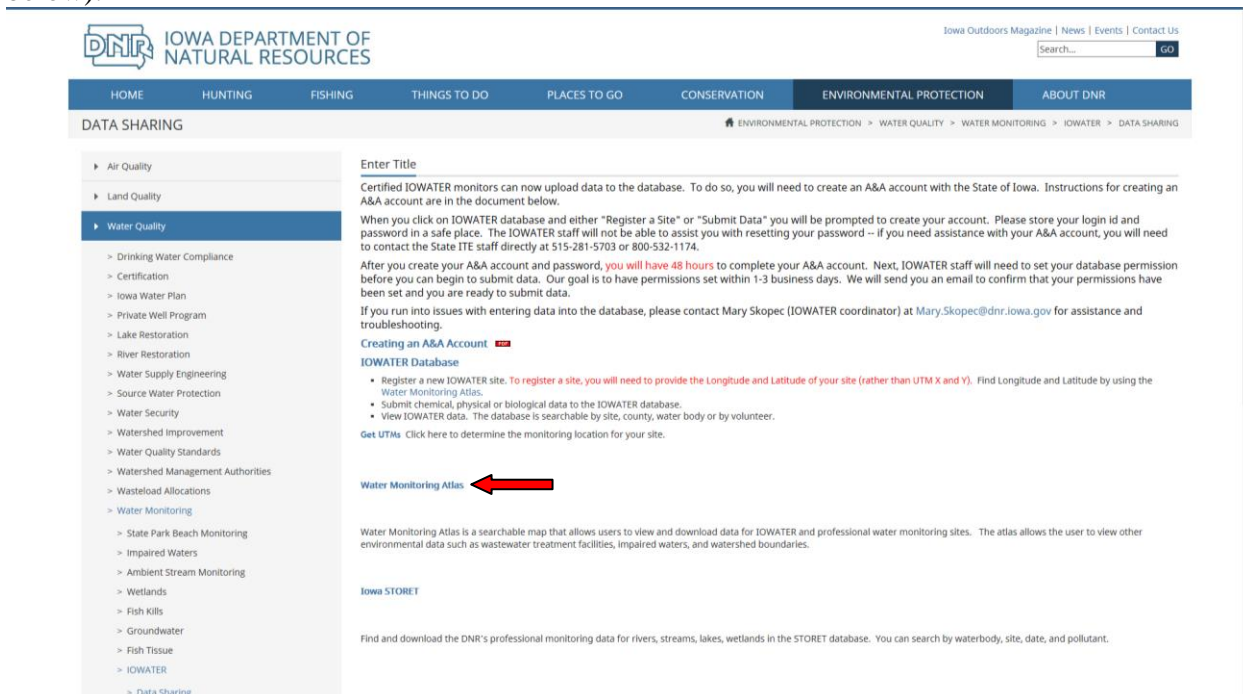




Identifying Latitude and Longitude Coordinates for Your Site Using the Iowa Monitoring Atlas

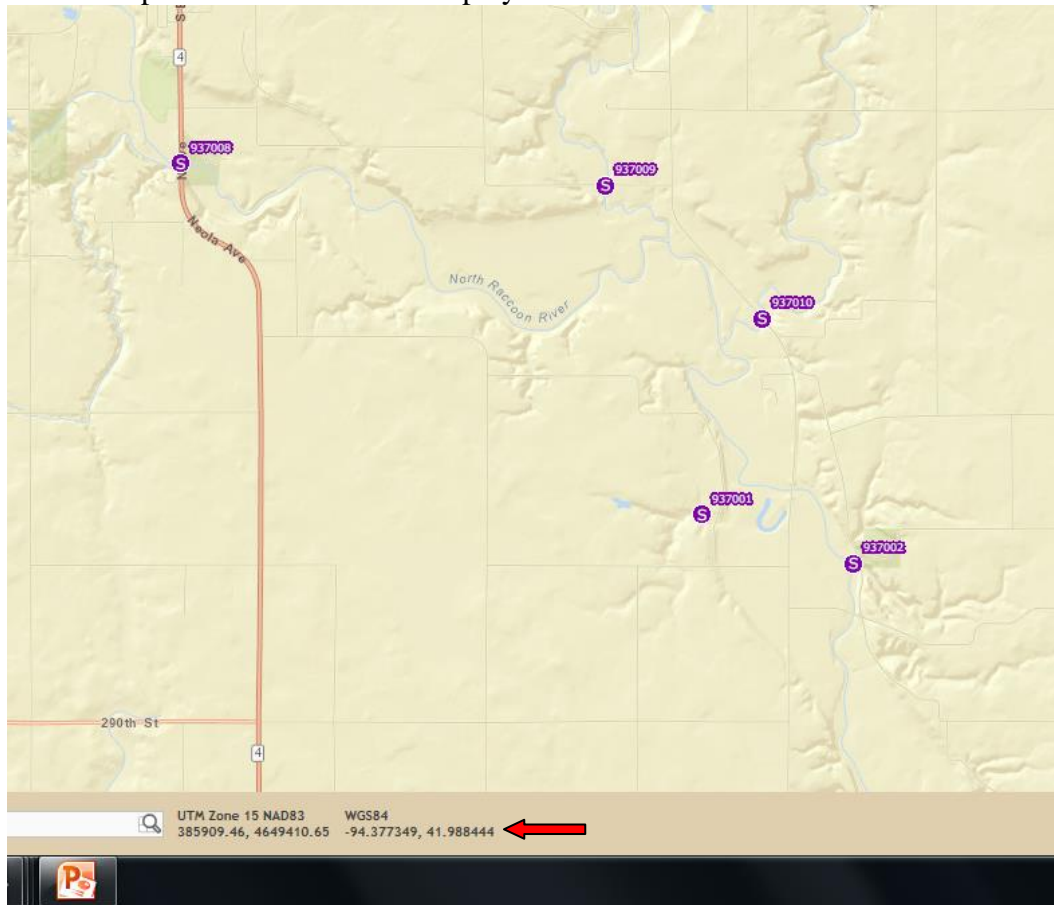
1. Go to the IOWATER website at www.iowadnr.gov/iowater NOTE: This process is designed to work with Internet Explorer – other browsers may not work.
2. Click on the “Data Sharing” menu item on the left side of the screen.



3. On the Data Sharing Page, click on “Water Monitoring Atlas” (see the red arrow in the figure below).



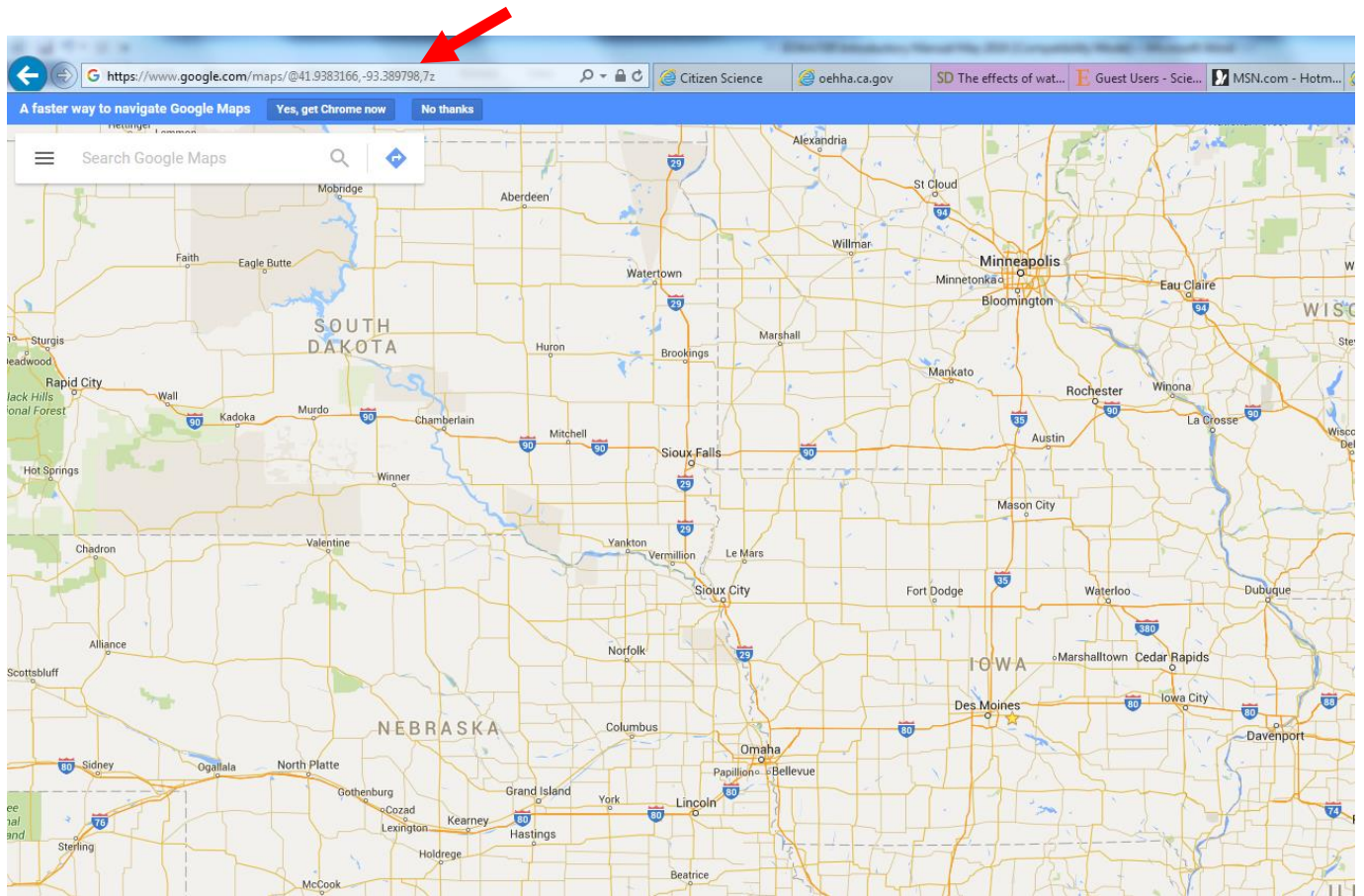
4. Once you reach the Water Monitoring Atlas site, use the “+” button  to zoom into a site.
5. Identify streams and familiar landmarks (towns, road, etc.). If you don't recognize the area, you can zoom out using the “-” button  to get a larger view.
6. Once you can identify your monitoring site, hover your mouse over the site. At the bottom of the map the coordinates will display in both UTM X and Y and Latitude and Longitude.



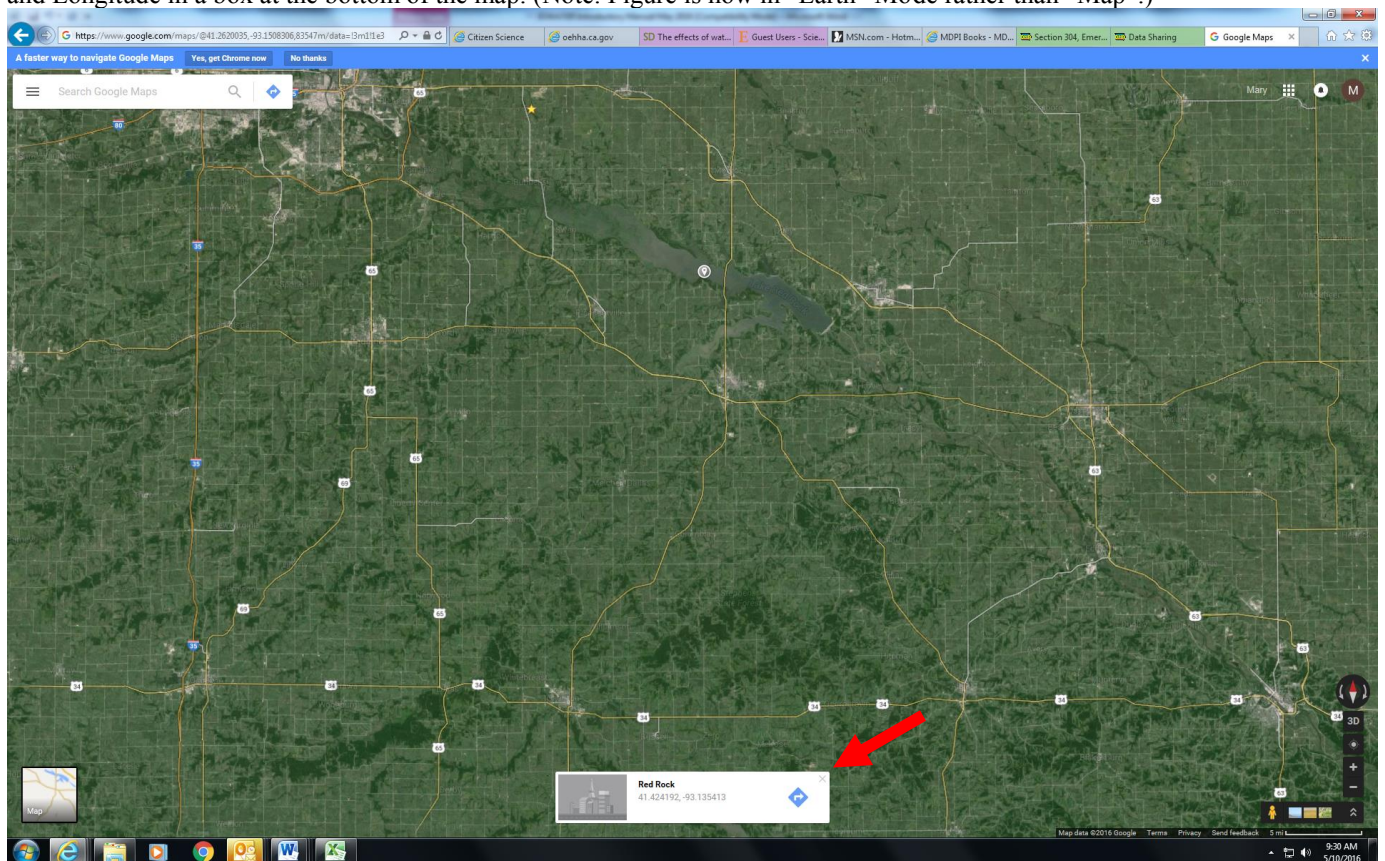
For the example, Site 937008 on the North Raccoon River at the Highway 4 bridge on the left side of the map has coordinates of -94.3777349; 41.9888444 (as shown underneath the “WGS84” descriptor at the bottom of the page above and indicated by the red arrow). Make sure to include the negative (-) sign on your longitude value when you enter your coordinates in the IOWATER database.

7. You will need these coordinates to register your site with IOWATER. Write the coordinates down so that you have them handy when you are ready to register your site.

You can also find Latitude and Longitude on Google Maps at www.googlemaps.com. If you click anywhere on the map, a star shows up on the map (yellow star) and the Latitude and Longitude appear in the menu bar at the top (see red arrow)



If you zoom into the Google Map and click on the stream, creek or lake of interest, a point pops up with the Latitude and Longitude in a box at the bottom of the map. (Note: Figure is now in “Earth” Mode rather than “Map”.)



Note to those using a Global Positioning System (GPS) in the field.

If you are using a Global Positioning System (GPS) to determine UTM or Latitude/Longitude coordinates, be sure your GPS unit is set to the system to display NAD83, not NAD27. NAD refers to the North American Datum. NAD27 is a reference system based on surveys. NAD83 represents an adjustment made to NAD27 using satellite data, which is more accurate. Paper copies of the U.S. Geological Survey **topographic maps** are on NAD27, whereas the topographic maps on the Iowa Geographic Image Map Server are on NAD83. The UTM Y coordinate on these two systems differs by about 200 meters, while the UTM X coordinate is the same.

The Driving Tour

With your watershed map in hand, you are ready to "hit the road." Taking the time to familiarize yourself with your watershed will be time well spent as you begin your monitoring program. Doing this at the onset of your project will give you a firm sense of what factors in your watershed may impact water quality.

You should have at least two people in the car as you do this – one to drive safely and one to mark your map and take notes. It is helpful to go during a time of day when there may not be a lot of traffic. Do this in daylight, so you don't miss structures that may not be visible at night.

What should you be looking for and jotting down? The answer is ANYTHING that may affect your stream. Here's a list of a few things to pay attention to:

- Animal Feeding Operations – How many buildings? What kind of livestock? Are there any evident drainage ditches or waste lagoons?
- Golf Courses – How large are they? Do they have streams or drainage ditches? Are there buffers along these waterways? Any ponds?
- City or County or State Parks – How much mowed area is there? Are there areas of heavy pet use near waterways?
- **Row Crop** – Is there evidence of good conservation practices such as grassed waterways, terraces, contour cropping, or others? Are streams lined with conservation buffers or is there row crop to the water's edge?
- Residential Areas – Can you pinpoint where storm sewers enter streams? Are there construction areas? Are they using proper silt fencing? Are there efforts to plant trees along waterways? Where does the sewer district discharge, or are most houses on private septic systems?
- Retail or Industrial Areas – Are there large parking areas with drainage to a stream or to a storm sewer system which connects to a stream? Where does the sewer district discharge? Are there any water discharges of thermal differences, such as water used in cooling power plants or factories? Are there piles of "unidentified" barrels or waste tires?
- Other types of land use – What potential impacts do they pose? Are there any conservation practices in place?
- The number of animals and what types of animals are in the watershed?

This is a list of just a few things to look for and is not complete by any means. You need not answer every question listed here. They are meant only to start you down the road to considering what is in your watershed and what may impact water quality as you begin monitoring.

The information collected during your driving tour is for your use only. It is strongly recommended at the beginning of your monitoring, and an annual update may be useful if you can do it.